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1. there has been no information by the USSR for dissemination outside of the USSR on the Kuibyshev Power Development project since the 1952

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3. the USSR has available a number of leading East German electrical engineers who had experience in building the

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380 KV line in Germany. it will be completed sometime in 1955.

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4. [redacted]

5. [redacted]

"In June 1953, a conference was held on overvoltages of internal origin in the transmission line Kuybyshev-Moscow, which was convened by the Commission on Long Distance Power Transmission of the Soviet Academy of Science (VeNIN). The aim of this conference was to report on the results of research carried out by various organizations in the Soviet Union in conjunction with the design of the first 400 KV transmission line, the length of which is 850 km. About 30 people, representing 11 organizations, participated.

"In his opening address, Mr V I Popkov [illegible] said that owing to the great length of the transmission line [illegible] the high power of the transformers connected to the line ends, and also due to the presence of transverse and longitudinal compensation, the conditions in the Kuibyshev-Moscow transmission line [illegible] favorable for the occurrence of various types of resonance overvoltages which do not occur in existing 110 and [illegible] KV transmission lines. In addition to overvoltages at the far end of the line due to the length being approximately that of a quarter wave length, resonance can also occur for even and odd harmonics due to magnetic saturation of the transformers. During circuit breaking, overvoltages can occur which are characteristic for compensated transmission lines and are due to the mutual effect of the inductance of the transverse connected chokes with the longitudinal capacitance compensation. Finally, overvoltages may occur during switching off of sections of the line or of the entire line, and also during switching off of chokes or transformers in the no-load condition.

"Owing to the great complexity of the processes involved, investigations on models consisting of equivalent circuits are considered very important to obtain information. Particularly, the problem of taking into consideration the non-linearity of the line parameters due to corona phenomena of the individual conductors has to be solved.

"Corona on the line has an important influence on some of the above enumerated phenomena. The particular importance of corona effects for very high voltage lines is explained by the fact that for the same

electric strength reserve, i e, for an equal ratio of the voltage at which corona effects occur to the operating voltage of the line, the intensity of corona effects increases with the square of the line voltage. It can be considered an established fact that in addition to active power consumption, corona also has an influence on increasing the apparent line capacitance. In addition, it is necessary to take into consideration the influence of combined (complex) shape of the voltage curve on the corona characteristic. It is also necessary to solve the problems of equivalent circuits for corona phenomena in three-phase lines, on the suitability of equivalent circuits for representing transient phenomena, etc. In conclusion, Popkov formulated a number of concrete problems to be discussed at the conference.

"During the first day of the conference, the following papers were read:

S S Shur (DC Research Institute): 'Work of NII (Research Institute on DC) on the problem of investigating the overvoltages of internal origin in the Kuybyshev-Moscow transmission line.'

L F Dmokhovski (Moscow Power Supply Institute 'V M Molotov') 'Investigation of the internal overvoltages in the coupled (Link ?) alternative of the power transmission line Kuybyshev-Moscow in the case of applied longitudinal compensation.'

M S Libkind (Power Supply Institute 'Krzhizhanovski'): 'Investigation of higher harmonics of voltage and current in long lines due to transformer operation.'

O V Slepherbachev (Leningrad Polytechnical Institute 'Kalinin'): 'Problems of modeling of corona effects in three-phase lines.'

M M Akodis (Ural Polytechnical Institute 'S M Kyrov'): 'Overvoltages due to switching off of no-load transformers, methods of limiting such overvoltages and the requirements to be met by circuit breakers in such systems.'

"The second day of the conference was devoted to discussion of the papers.

"In the resolutions of the conference it is mentioned that the results of the investigations established the possibility of occurrence of complex undamped voltage oscillations in the transmission lines due to saturation of the steel of the transformer and reactance cores. If a transmission line which does not possess longitudinal capacitance compensation is switched off, the voltage curve may contain components of double and five times the (fundamental ?) frequency and considerable amplitude values. Thereby, the maximum voltage in the designed transmission line system does not exceed 3 V phase (rated).

"If the circuit is broken whilst the capacitance compensation is in operation, the voltage curve may contain components of a frequency below 50 cps of considerable magnitude. In this case it cannot be guaranteed that the line voltage will not exceed the value 3 V phase (rated).

"The probability is slight as regards occurrence of higher harmonics of considerable voltage amplitudes during normal operation of the transmission line. However, this problem does still require further investigation.

"The methods of calculation presented during this conference permit determination of the conditions of existence and also quantitative

evaluation of the voltages and currents of undamped oscillations of the frequency f/3 which are sustained by the reactances and the condensers of the longitudinal compensation. The conditions of occurrence of a second and third harmonic can also be determined analytically.

"The conference arrived at the conclusion that the maximum overvoltage during switching off of sections of the transmission line, first (?) switched off from the other (?) end (?), does not exceed 3 V phase (rated). The overvoltages during switching off of no load transformers can be higher than this value. However, these overvoltages are generated with a low energy reserve and can be limited by applying valve type arresters.

"The conference revealed that experimental investigations of the corona characteristics were carried out in the steady state operation on a test section of the 400 KV line, and for steady state and transient operation on various model circuits. On the basis of the obtained results model circuits for corona investigations were worked out which reproduce the corona characteristics of the line in the steady state conditions of operation with an accuracy adequate for practical purposes.

"The research tasks aimed at completion of the design of the Kuybyshev-Moscow transmission line project were formulated and also those of general scientific and technical importance."

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25X1 6. [redacted] this report [redacted] is the only published work since 1952 [redacted] it indicates the interest of the Soviet engineers in the Kuibyshev project and the extent of the electrical engineering and research that has been put into the project.

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25X1 7. [redacted] it does not appear that the Soviet engineers and scientists have kept up with what has been done [redacted] on high voltage lines and that they are trying to solve problems that [redacted] electrical engineers worked on at least five years ago [1949]. However, it emphasizes that the Soviet engineers and scientists are working very hard on this problem and that the lag is narrowing and further, that some of the best scientific brains in the USSR are being used on this project.

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25X1 8. [redacted] the Soviet manufacturing plants can build all of the special type of equipment needed for the Kuibyshev project and it is well-known that there are a number of East German engineers available in the USSR for this purpose. The Soviets have the plant capacity, the large transformers and the laboratory capacity for testing 400 KV equipment.

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